

# COST *and* MANAGEMENT

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## Punched Hole Accounting

By S. R. BATES,

*International Business Machines Co. Ltd., Winnipeg.*

(Before Winnipeg Chapter, December 16, 1929)

IT is with a great deal of pride and yet fear and trembling, that I stand before you this evening. Proud that you should have honoured me, in addressing this meeting of your Winnipeg Chapter—a Chapter in which I hope I have the privilege of serving when called upon. The fear that besets me is not the fear of comparison of Hollerith method against manual methods, but the fear that I may not do justice to a wonderful subject, owing to my limitations as a public speaker.

However, gentlemen, I will trust that you will bear with me and not expect a masterpiece of oratory, but a story told of a simple accounting method, and told in a simple manner.

If there are any points which I fail to make clear, I shall be only too pleased to answer any of them, to the best of my ability, after the reading of my paper.

In delivering a paper of this nature, I am somewhat handicapped in not having a set of electric tabulating machines on the floor before you for demonstrating purposes, but, as it is an impossibility, we will have to content ourselves with comparing the punched hole methods with the manual, and I trust that with the aforementioned handicap that I will be able to impress upon you the speed, flexibility and accuracy of the Hollerith method.

### History of Electric Equipment

I would like, at this point, to somewhat review the early history of electric tabulating equipment, as I feel that most people are interested in knowing how these marvelous modern-day inventions come about, also a little about the person that could conceive such almost human machines.

The art of electric accounting has grown from the ideas of Dr. Herman Hollerith, and the requirements of the United States Census Bureau, which brought the tabulating machines into being. At the close of the compilation of the tenth United States Census in 1880, the attention of Dr. Herman Hollerith, an engineer who had won early distinction as a statistician, was drawn to the needs of mechanical aid for census tabulation. For this purpose Dr. Hollerith developed a system of recording the descriptive data for each individual, or each unit of enquiry, by punching holes into strips of paper, and later on into tabulating cards, which could be used to control electrically operated mechanism in the form of counting or adding devices. The first practical uses made of these early machines was in taking the tabulations of the mortality statistics in the City of Baltimore. They were next used for the Bureau of Vital Statistics in the State of New Jersey, and also by the Board of Health Department, New York City.

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At the beginning of the eleventh U.S. Census in 1890, a commission of three expert statisticians was appointed by the superintendent of Census to make a practical test of all the systems of tabulation which were available at this time in the United States. The report of this commission showed that the punched hole method of tabulation was not only far more rapid than any other method, but its accuracy placed it far ahead of all the others. As a result of this report, Dr. Hollerith's method of tabulation was selected to compile the returns for the eleventh U.S. census.

The success of the Hollerith tabulating method in this census attracted world-wide attention, and resulted in the government of Austria Hungary using these machines for their census.

During the process of taking the eleventh census, 1890, the attention of Dr. Hollerith was called to the need of some machine or device to aid in the audit of railroad freight accounts and to the calculation of the commodities statistics. Experiments were made at the office of the auditor of freight accounts of the New York Central Railroad. The test proved the work could be done to advantage by this method. In the application to this system of railroad work and commercial accounting, it was found desirable to make radical changes in the apparatus that was used to record the amounts and different data.

While the number of columns on the present day cards are greater than was used in 1890, the size of the card remains the same, which indicates how well, and on what a solid foundation of research Dr. Hollerith's early work was based.

Since this early date there has been a constant improvement on all tabulating machines to such an extent that practically every branch of industry and commerce is able to use them, and benefit from this great man's foresight.

I might mention, with regret, that Dr. Hollerith passed away on November 17th, this year, at Washington, D.C., after only two days' illness, but it is pleasing to know that he lived long enough to see his invention used in 64 countries of the world and in practically every government institution.

The year 1902 saw the machines change from the hand feed to the automatic feed. Previously the cards had been placed in the machine at the rate of one at a time, by hand, but now they were placed in a hopper, in lots of 400 or 500 at a time, and automatically sent through the machine itself, one at a time, at the rate of 150 cards per minute.

Still another big improvement was the application of a plug board, somewhat similar to a telephone switchboard, so that the machine could be arranged to add in any desired position of the card.

There has since been a constant improvement in tabulating machines, the automatic control and the total-printing and listing features probably being the most important.

### Purposes and Methods

Having covered the early history of these wonderful machines, we will now consider for a while why and how they were used.

## COST AND MANAGEMENT

In developing any business, in seeking results through any line of research, statistics must represent facts. To be potent, they must be directly contributing.

There is a wide difference between knowledge and wisdom. So with facts and figures. A lot of big business men frequently remark upon the temptation to accumulate useless and unnecessary statistics. There is no better example of this than of noting the difference between superficial and vital facts and figures. In this age of practical economics it is amazing how much loss and wastage are traceable directly to useless statistics.

Realizing the present intensive competition, the alert executive of an industry—large or small—hesitates to navigate by dead reckoning. He concedes the necessity of promptly and accurately tabulating the vital experiences and will carefully chart his course.

Such a procedure constitutes a logical administrative or operating expense with every up-and-going concern. Hence the importance of employing the most economical method.

In a five-million-share day on New York's big board—and that's small to some of them we have had lately; and with the ticker running an hour or two behind—the average investor largely operates by dead reckoning, and look what happened to him recently.

The ticker, although a wonderful little machine, is not flexible enough to tabulate the market's present mass production. With the average industry the antiquated long-hand method of tabulating statistics, with its frequent delays and harmful waste of time, is not an economy. Plainly, it is too often just "dead reckoning."

If the facts and figures of a concern are to be of any use, they must be tabulated by the most rapid, accurate, and economical method, and in the majority of cases, modern efficiency points its finger to "Punched Hole Accounting."

If the vital facts of any business are to reach fruition, then they must be separated from the useless ones. If intensive competition is to be overcome, these facts must be sorted and sifted by the most prompt, accurate and economical means. This is not a theory but a condition.

While many of my fellow members here to-night are familiar with the tabulating machines, it would seem in order to briefly outline the Hollerith idea.

### The Hollerith System

The Hollerith system provides mechanical equipment for recording, sorting, summarizing and tabulating information of all kinds pertaining to business.

I personally think it is perhaps a wrong term to speak of it as the "Hollerith System," because, after all, it is not a system, but a method. You can supply the system; we just have the tools, or method, to apply to your system, and in most cases we are able to take your present system and adapt it to tabulating machines, so that it is got out with great speed, economy and mathematical exactness, and usually without dislocation of the existing underlying systems.

Hollerith machines record or add numerals only, so that all names, descriptive and symbols, must be expressed and recorded in numerals;

## PUNCHED HOLE ACCOUNTING

in other words, codes are set up. To my mind, numerical codes are the most concise and positive means of identifying the names of accounts, articles, departments, geographical divisions, or any other classification that may be desired.

The detailed coded element of any statistical or accounting problem, when correctly transcribed by means of punched holes, immediately becomes the medium for compiling innumerable analysis, exact in every detail, because punched holes form a record which is unchangeable, and not subject to transposition.

All large companies have realized for some time the many advantages of using numerical codes, and to-day almost everything in connection with the manufacturing of a product is assigned a number. Numbers are assigned to men for the easy preparation of payrolls, as an example.

Names are very confusing, and in many cases as high as twenty names have been used for a certain article. A number eliminates this condition, leaving no chance for such an error. Invoices are numbered, saving thousands of dollars in writing long names of parts, etc.

We find in some cases a certain fear of changing to a code system. That is my reason for taking up so much of your time explaining its benefits.

Holes are punched into the tabulating cards. Records of every nature may be transcribed from the original, but instead of being written or typed, the transcribing is done by punching holes—a sort of mechanical shorthand. The card most frequently used has 45 vertical columns of figures, each column has 0 to 9 (see sample). A card of the same size, but having 80 columns, is available for more amplified records.

To insure almost absolute accuracy, the punching in each case is verified. Several methods are in use. A verifying machine can be used. It is somewhat similar to a key punch, but does not punch holes. If an error has been made the machine stops. We are working on the theory that no two people make the same error. There is also the visual method, which consists of checking the perforations against a dark background, and the method of checking by comparison of light and color. Two cards of opposite colors are prepared from independent records and held together against the light. This latter method is used largely by insurance companies. In some cases they have two sets of cards.

A final check that is often used, is obtained by using the tabulating machines, either by listing the information on each card on paper and checking against same, or adding the columns to be checked and comparing the totals so obtained with pre-determined totals of original records. All of the above methods can be done very rapidly.

After the cards are punched and checked, they become a well of information that can be drawn from at will, and pertinent data tabulated with confidence of absolute accuracy, as we have now entirely eliminated the human element.

I might say a word here about the speed of key punching. The average operator punches about 2,500 cards per day, full 45 columns, but of course we must take into consideration the number of columns

## COST AND MANAGEMENT

to be punched and the legibility of the original record, when figuring on a fair day's output from the key punch machine.

### Sorting the Cards

Now we come to the sorting of the cards. This is done on an electric sorting machine that arranges punched tabulating cards into sequence or desired classifications, through the medium of punched holes in the cards. Our latest development in sorting machines is able to operate at a minimum speed of 400 cards per minute for a single line. This machine for instance is used to arrange the cards for payroll purposes into man number, and then back again into account number for your labor distribution; or classifies them by departments, machine number, operations, or other accounting and statistical groupings that may be desired.

The sorting feature is one of the contributing features of Hollerith, that makes it so speedy of operation. Any person that has had experience of sorting original payroll cards, invoices, etc., into some desired sequence, can realize the beauty of having this done at 400 per minute, with no manual effort whatsoever, other than putting groups of 1,000 cards in the machine.

If you gentlemen will kindly refer to the sample Hollerith cards which you have before you, I will endeavor to explain the high points of their uses. As you realize, it would be an absolute impossibility for me to go into details on the use of each of these cards, in the time allowed me this evening, but I would be pleased at some future date to take any single application which you may choose and follow same right through to a conclusion.

### Exhibits

Please refer to Exhibit "A." This you will find is a labor distribution card, and a glance under the heading at the top of the columns will, I am sure, impress any cost accountant that we have covered the labor distribution application in very great detail. These cards are punched from the slips made out by a workman, which have been checked by the foreman as to accuracy and the hours and rates extended by a comptometer operator. After the cards are punched they are verified as to accuracy of punching. The first report got out daily by this firm was the amount of productive and non-productive labor by departments. When the machines were first put into this concern this report was the means of cutting down considerable non-productive labor. This card was also the means of obtaining the labor costs against any given piece which they manufactured. It was also a check against the number of pieces produced by each workman in a given period of time. Tabulation of expense labor such as crane, elevator, floor sweeping, etc., was run weekly. After all the pertinent data they desired had been tabulated the cards were filed away behind tab cards in order number sequence so that upon completion of any particular order the cards for that order number are run through the tabulator and the labor costs obtained very rapidly (160 cards per minute). These labor cards are used in conjunction with a set of material requisition cards, of which I am sorry I have no samples here to-night, and you can readily see that your material and labor costs can be secured almost immediately upon completion of an order.

## PUNCHED HOLE ACCOUNTING

Exhibit "A".

### LABOR DISTRIBUTION

[illegible]

### DISTRIBUTION OF EARNINGS

Exhibit "B"

## DEDUCTIONS

[illegible]

Exhibit "C"

[illegible]

# COST AND MANAGEMENT

## MATERIAL DISTRIBUTION Exhibit "D"

DATE	NO	REF	18	REG NO	AMOUNT	REPAIRS-RENEWALS CONSTRUCTION NO	ALP	WORK ORDER	CODE	AMOUNT CREDIT
0000	0000	0000	00	000000	00000000	000000	000000	000000	00000000	00000000
1111	1111	1111	31	111111	11111111	111111	111111	111111	11111111	11111111
2222	2222	2222	32	222222	22222222	222222	222222	222222	22222222	22222222
3333	3333	3333	33	333333	33333333	333333	333333	333333	33333333	33333333
4444	4444	4444	34	444444	44444444	444444	444444	444444	44444444	44444444
5555	5555	5555	35	555555	55555555	555555	555555	555555	55555555	55555555
6666	6666	6666	36	666666	66666666	666666	666666	666666	66666666	66666666
7777	7777	7777	37	777777	77777777	777777	777777	777777	77777777	77777777
8888	8888	8888	38	888888	88888888	888888	888888	888888	88888888	88888888
9999	9999	9999	39	999999	99999999	999999	999999	999999	99999999	99999999

POLIC	LINE	SALES MAN	INTERVIEW	NO	REG NO	AMOUNT	REPAIRS-RENEWALS CONSTRUCTION NO	ALP	WORK ORDER	CODE	AMOUNT CREDIT
00000	00000	00000	00000	000000	00000000	000000	000000	000000	000000	00000000	00000000
1	DATE				APPLIANCES					ACCOUNT NO	1
2	DISTRICT				STOVE					NAME	2
3	SALESMAN				WASH MACHINE					ADDRESS	3
4					REFRIG						4
5	INTERVIEW				REPAIRS					555555555555555555555555	5
6	PHONE HOME				WASH MACHINE					666666666666666666666666	6
7	COMPLAINTS				REFRIG					777777777777777777777777	7
8	ROOM				WASH MACHINE					888888888888888888888888	8
9	COUNT				REFRIG					999999999999999999999999	9

## Exhibit "F"

## WELFARE STATISTICS

A-S	NAME	DEPT	NUMBER	STATUS	BORN	KNOWLEDGE	LAST	SALARY	No. Days	Amount of	NOT PAID	DATE	Payments	Other	STATUS	DATE
0000	00000	000000	000000	00	0000	000000	000000	000000	000000	000000	000000	000000	00000000	00000000	00000000	00000000
1111	11111	111111	111111	11	1111	111111	111111	111111	111111	111111	111111	111111	11111111	11111111	11111111	11111111
2222	22222	222222	222222	22	2222	222222	222222	222222	222222	222222	222222	222222	22222222	22222222	22222222	22222222
3333	33333	333333	333333	33	3333	333333	333333	333333	333333	333333	333333	333333	33333333	33333333	33333333	33333333
4444	44444	444444	444444	44	4444	444444	444444	444444	444444	444444	444444	444444	44444444	44444444	44444444	44444444
5555	55555	555555	555555	55	5555	555555	555555	555555	555555	555555	555555	555555	55555555	55555555	55555555	55555555
6666	66666	666666	666666	66	6666	666666	666666	666666	666666	666666	666666	666666	66666666	66666666	66666666	66666666
7777	77777	777777	777777	77	7777	777777	777777	777777	777777	777777	777777	777777	77777777	77777777	77777777	77777777
8888	88888	888888	888888	88	8888	888888	888888	888888	888888	888888	888888	888888	88888888	88888888	88888888	88888888
9999	99999	999999	999999	99	9999	999999	999999	999999	999999	999999	999999	999999	99999999	99999999	99999999	99999999



## PUNCHED HOLE ACCOUNTING

Kindly refer to Exhibit "B". This card, you will note, is a payroll card where the firm has the Bedaux system in force. It would take me several sessions to go into the details of the Bedaux system, but sufficient to say that the only two firms that I know of, which are using the Bedaux in Canada, are using Hollerith machines for their payroll and "B" trends. I believe that the Bedaux point system was fully covered around November last year by Mr. W. R. Hodgson, of the Canadian Kodak Company. This is the other firm using Hollerith machines in conjunction with Bedaux.

Referring to Exhibit "C", which is a sales card. You will note that all the data pertaining to a sale, as to cost, where shipped, the kind of container, the value of container, etc., are included in this card. From this card reports are run as to productivity of each salesman or agent, also a report showing amount of sales by trade groups or kind of trade, a report by commodities, by districts, and

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**THE Acklin**

DATE \_\_\_\_\_

TOLEDO, OHIO

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TO THE ORDER OF AT THE TOLEDO TRUST COMPANY, TOLEDO, OHIO 58-8

Exhibit "G".

IN FULL TO \_\_\_\_\_

BY \_\_\_\_\_ CASHIER

REMARKS: PLEASE DO NOT CANCEL OR SPURGE ON RIGHT HALF OF THIS CARD OR THE IMPRINT REMAINS FOR USE OF ELECTRICAL ACCOUNTING MACHINES

**STAMPING COMPANY**

BONUS 1921 \_\_\_\_\_  
PAYROLL 1921 \_\_\_\_\_

MAILED NO.	CHECK NO.	PERIOD	EMP. NO.	AMOUNT
0000	0000	00	0000	0000
				1111
				2222
				3333
				4444
				5555
				6666
				7777
				8888
				9999
				(42 43 44 45)

total sales. In using the Hollerith machines for sales analysis purposes, sales reports can be got out while they are yet news, as most you gentlemen will agree that an old sales report is ancient history, and is therefore practically useless.

Referring to Exhibit "D" you will note that we have a material distribution card. This is the medium whereby the various amounts of material are charged against the different work order numbers. Some concerns find it a great advantage to keep a perpetual inventory by punching sales cards at inventory time. Material distribution cards are a debit to stores and receipts are a credit to stores, and daily, weekly or monthly, as desired. These cards are run through the tabulating machine controlling an article number and gives net balances of stock for each article.

I will not go into detail on exhibits "E," "F," and "G," as I believe my time is already up. Sufficient to say that Exhibit "E" is used to determine the number of various electrical appliances in the citizens' homes. This is used as a chart to determine the activities of the door-to-door canvasses of the new electrical appliances.

Exhibit "F" is a welfare statistics card, and in glancing over the headings one can readily see how this card can be used to advantage in a concern that employs a large number of men.

Exhibit "G" is a tabulating card cheque. This application is very popular in the United States, where it is not necessary to put

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a stamp on each cheque. One can imagine the advantages of using a punch card for a cheque. Reconciliation with the bank balances can be made immediately. Outstanding cheques can very readily be traced, etc.

I wish to thank you gentlemen for the opportunity given me to speak here to-night, and, as stated before, I shall be pleased to answer any questions which you may care to bring up.

I trust that I will again have the opportunity to select one particular application which will be of interest to you all, and go thoroughly into detail, showing the advantages of the Hollerith system over the manual method.

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## Cash Discounts—Credit Notes

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OUR Society recently put the following questions to a number of large concerns:

(a) Do you deduct credit notes before applying cash discount and thereby take cash discount on the net amount? Or

(b) Do you first of all take cash discount from the gross payment and then deduct the credit notes?

Out of 32 companies replying, 30 follow the procedure laid down in question (a), thereby deducting credit notes from the gross figure and applying cash discount to the net payment. Two companies follow the practice laid down in question (b), thereby taking cash discount from the gross payment and then deducting credit notes.

One of our members who has studied this question thoroughly, reports:

"The proper method of applying cash discounts where credit notes affect the situation has been the basis of many arguments, but it would appear from the replies that the method of applying cash discount after deducting credits and therefore from the net payment, is more or less uniform in Canada.

"I had the same question raised through a similar organization in the United States, and it would appear that there the practice of deducting cash discount from the net payment is not so uniform as it is in Canada. The United States would appear to be a fifty-fifty proposition."

Bearing on this last point, one of the two companies in Canada is strictly Canadian, while the other is subsidiary to a United States corporation. The practice of one of them, which distributes its products through local agents or dealers, is outlined as follows: "It has always been our policy to take the discount on the gross payments, and then deduct the credit note. We feel justified in taking this course, as our vendors have the use of our money previous to the discount period elapsing. In other words, if they had chosen to send us their cheque it would have paid our debit against them, and thus closed the transaction, in which case we would naturally have our full discount on the next remittance to them, therefore, we are really entitled to the full discount on their invoices to us. We find this to be a very common practice among a great many of our dealers when

## CASH DISCOUNTS—CREDIT NOTES

sending remittances to us, and we believe that they are justified. If they did not do this, it would be necessary for us to issue a cheque to them every time a credit is issued."

The 30 companies who evidently follow the more general practice in Canada include both Canadian firms and some which are branches of United States concerns.

In the replies, some refer to cash discounts on their purchases, and others to cash discounts on their sales; this difference, of course, does not affect the value of the reply. There are, however, a number of variations in practice which may be of general interest, and which are covered by the following extracts from replies:

1. "In our line of business we do not give any cash discount. However, in my opinion all credit notes should be deducted from the total amount before applying any discount; cash discount should only apply to the net payment. For instance, if the account in question was for a gross at \$1,800.00, and there was a total of credit notes in connection with the shipment of \$100.00, the net payment would be \$1,700.00, and any cash discount which was to be allowed would be based on the net payment of \$1,700.00."

2. "I do not see how cash discount could be claimed upon a sum which does not have to be paid."

3. "If the credit note covers merchandise we deduct the credit note from the invoice and take the cash discount from the net figure. If, however, the credit note covers containers or allowances for freight, etc., on which no discount applies, we take the cash discounts from the gross figure."

4. "We do not give cash discounts, but our understanding of cash discounts is as follows: If we purchased goods and a discount of 2% is allowed if paid within fifteen days, and for some reason or other we return some of the goods because they are not up to the standard, I would say, we are not entitled to the discount on the amount of the invoice after the credit note has been deducted. If, on the other hand, we purchased goods in June and took our discount, then purchase more goods in July; and before paying for July goods we found that some of the June goods were not up to the standard, we would return the goods and take credit off July purchases before taking discount."

5. "When cash discount is deducted it is reasonable to suppose the discount is given for prompt payment and as payment is made for the amounts due, why can one propose to deduct cash discount from gross amounts as the credits are surely deducted from amounts incorrectly stated. Suppose a person bought \$1,000.00 of goods at 2 per cent 10 days, returned \$800.00 before payment is due, is he supposed to take 2% from the \$1,000.00? Surely not, his purchase is only \$200.00, and this is the amount he is to compute the cash discount on."

6. "The fairest way to treat credit notes applicable to invoices, subject to cash discount, is to deduct the credit note first from invoice and then take the cash discount from the net amount. It can be done either way, subject to acceptance by the firm to whom the cheques are made payable. In my opinion, a cash discount is applicable to the cash disbursed and should be computed on the net amount due."

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7. "Our usual procedure is to deduct credit notes, and then take discount on the net amount. When credit note is for drums returned (not subject to cash discount) the discount would be taken before deducting credit. In cases where material was billed at 'freight included' price, but shipped collect and we paid freight, this being charged back to shipper, discount would be taken on the balance after deducting the amount charged back."

8. "When paying our accounts we take the amount of the invoice, deduct any credit notes and take our cash discount on the difference. We feel that a credit note is a deduction from a charge, and that we are not entitled to cash discount on any more than the net amount. We might state that in the collection of our accounts we do not allow our customers to take cash discount on any more than the difference between invoice and credit notes."

9. "It is our practice to deduct all credits or allowances before applying cash discount, and thereby to take the benefit of cash discount on the amount actually paid. Our reason for this decision is that allowances are usually made us to cover goods returned or overcharges adjusted, and as we have already taken discount on these amounts when paid originally, it is obvious that we are not entitled to the deduction a second time. In general we apply the same rule to accounts receivable, but are willing to give special consideration as the circumstances warrant."

10. "We would deduct the credit note if it had a direct application to the goods upon which the cash discount was to apply; but if it had no relation thereto, or applied to another period of sales, certainly we would not deduct the credit note before calculating the discount."

11. "We do deduct credit notes before deducting cash discounts, and thereby take cash discounts on the net payment. These credit notes are understood to be those credit notes which apply to the particular class of material purchased from a supplier."

12. "Where credit notes are issued affecting the price of merchandise subject to cash discount, such credits are deducted before cash discount is computed. In the case of credit notes covering freight adjustments or other net items to which cash discount is not applicable, the discount is calculated before such credits are deducted. In brief, cash discounts on credit notes are adjusted in accordance with the relation of the latter to the items subject to cash discount."

13. "When paying accounts we deduct credits from amount of invoice before discounts are computed. We find some of our customers taking discounts take it off the gross amount and deduct the credit notes after, but as we allow only one per cent the amount is so small that we generally accept payment."

14. "We allow cash discount on the net amount of the invoice. For example, we sell a — for \$500.00 and we allow \$50.00 for an exchange; we would figure the discount on the \$450.00."

15. "It is our practice to deduct credit notes from accounts before paying same to take advantage of cash discount. The only variation from this practice is when a special credit has been allowed by the vendor which by its special nature would prevent us from deducting from account, viz., special allowance for defective work, advertising, etc."

## CASH DISCOUNTS—CREDIT NOTES

16. "We give a cash discount of 1% per month for prepayment in advance of due date, based upon the amount of cash received. For instance, if a customer sent in \$99.00 one month in advance of due date, we would credit his account with \$100.00, or in other words we would accept \$99.00 as payment for \$100.00, thus giving 1% on \$100.00. Credit notes would not affect the situation."

17. "Whether or not credit notes are deducted from invoices for payment depends on circumstances. If the credit note is one that applies directly to the invoice, we deduct it first before taking our discount. This is only fair to our creditors. If credit note applies to a previous account which has already been paid we do not deduct this from any subsequent invoices that are paid before computing cash discount."

18. "We regard cash discount as a premium paid in order to give us the use of certain money. We therefore allow it on the actual payment made, which means that credit notes are first deducted from the gross indebtedness. Why not? Applying the well-known *reductio in absurdum*, if we charged you with \$100.00 in error and then issued a credit note to clear your account, would we still owe you the cash discount? Try and collect it!"

19. "We have made a brief review of our practice and advise that we take discount on the net value after giving effect to credits with the exception where credits are allowed affecting other than the value of the merchandise itself such as freight and express adjustments, return of containers and items of that nature. The only exception to this practice would affect cases where goods are returned or where the price has been reduced to meet revised market conditions."

20. "Where the credit note is applicable to a discount invoice previously set up and discount taken, we voucher succeeding invoices in the usual manner, taking discount on all discount items and then apply credit note, deducting therefrom discount taken on original invoice—if the firm sending credit note has omitted to do so."

21. "Our company have always taken the attitude that cash discount means exactly what they say it is, that discount applies on the cash involved in paying the account within the specified discount period. In other words we require our customers to pay the month's invoices less the month's credits, taking the cash discount on the net amount before the twentieth of the month following date of shipment. We use the same reasoning in paying our accounts payable. In the case where a customer pays the face value of an invoice or invoices less cash discount leaving the credit open it is our policy to mail our cheque for the amount of the credit less the cash discount. In a case where there are no debits against the credits we make it a policy of paying by cheque within the discount period less the cash discount. Our reason for this attitude, beside the self-sufficient fact of the discount being one for cash, is that the invoice value does not represent in all cases the final amount at which the goods are to be paid for. The credit memorandums are deductions from these invoices, and theoretically had the particulars been available at the time of invoicing they would have been deducted from the face value of the invoice, thus the customer would have been required to take discount on the net amount."

22. "Credit notes are taken out from the customer's indebtedness before taking off cash discount if the credit notes referred to repre-

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sent adjustment of prices or errors in connection with goods, which were originally billed subject to discount. Obviously, if the customer is debited with an erroneous amount the calculation of the discount should be made on the figure corrected by credit note. If, on the other hand, the credit notes issued are in respect of goods billed on a net 30 day basis or not subject to discount, such credit notes are not considered in discount calculations. In our particular industry our monthly statement is divided up in three columns, viz.: 2%, 10 days; 2%, 30 days; net, 30 days. The credit notes are inserted in proper column and deducted at the end of the month, so that the discount feature automatically takes care of itself."

23. "Where we purchase supplies on which a cash discount is allowed and part of the shipment has been returned, we, of course, would be entitled only to the discount on the net quantity paid for. This is so clear that I hardly think your inquiry has to do with anything of this nature."

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## Some Phases of Department Store Management and Accounts

By G. F. KLEIN,  
*Hudson's Bay Company, Winnipeg*

(Before Winnipeg Chapter, April 20, 1930.)

**J**UST how am I to obtain the interest of a Chapter of the Canadian Society of Cost Accountants in such a subject as Department Store Management and Accounts? Were I to undertake this task by a talk to your wives or sweethearts instead of to you, I am sure my chances for gaining an attentive ear (leaving out the accounts) might be far greater than with you, because cost accounts certainly seem rather foreign to department stores, whereas these stores to-day are an important part of every woman's life.

However, even you must have your occasional contacts with retail institutions, for how could you avoid it when it is said that one person out of every fourteen in Canada and the United States is employed by, or engaged in the retail trade? And after all, a lot of your good money finds its way each month into the bank accounts of our large department stores, and this fact alone may cause some slight interest in my subject. Also as accountants and executives, I am sure you will be interested in the problems of the typical store management in the assembling, display, and distribution of the tremendous quantities of merchandise which it hopes to sell at a profit.

More particularly as cost accountants, you will have some curiosity as to how the typical store management knows what to buy, when to buy, what merchandise is profitable, and what is handled at a loss. In solving this problem, I do feel that cost accounting is an important element and plays a part which is not generally recognized as being present. To illustrate what this is I will explain first the preparation of the merchandise budget, and then the operation of a typical unit control system by which profitable and unprofitable lines are determined as well as many other things essential to profitable merchandising:—

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### The Merchandise Budget

First, as to the merchandise budget—this is usually prepared by the store management a few months before the commencement of each spring and fall season. The following executives are chiefly concerned, and together try to prepare an intelligent attainable plan for each department's operations for the coming season:—

1. The store manager.
2. The general merchandise manager and divisional managers, if any.
3. The publicity manager.
4. The controller or accountant.
5. The departmental managers or buyers.

The actual budget as prepared usually consists of a special form for each department on which the following information is tabulated:—

1. Monthly sales for last year and possibly the year previous as well.
2. Monthly purchases for last year.
3. Monthly markdowns for last year.
4. Monthly stock on hand figures for last year and possibly the previous year also.
5. Percentage of initial markup, markdowns, and gross profit for each month or for the entire season.
6. Planned figures for each of the above for the new season.
7. Space is also provided for the posting of figures for actual performance from month to month.

For the purpose of controlling purchases within the budget figures and any necessary variations dictated by a comparison of actual conditions with the budget, the use of a merchandise report is necessary. This is usually made out on a weekly, ten-day, or monthly basis, and its purpose is to keep the management informed as to actual and planned performance and the remaining buying power of each department. In the preparation of this report due allowance is always made for variations between planned and actual performance so that departments will not be permitted to overbuy.

This report contains among other things a complete summary of all orders already placed, and how much additional may be placed for delivery in each remaining month of the season.

The open-to-buy figures for any one month are determined as follows:—

Stock beginning of month (at retail); orders (at retail); expected sales and markdowns for the month; desired inventory at end of month (at retail). The resultant figure shows how much the store may commit itself for at retail for that month's delivery, and still stay within the limits prescribed by the budget.

### Unit Control System

Now, as to unit control systems—it is the buyers, of course, who are trained experts in their own lines, and who must determine what and when to buy and in the total amounts as indicated by the periodic merchandise reports, and I will now show how a typical unit control



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system is operated. However, I should first like to outline the kind of an organization the store management has had to create in order to bring the merchandise purchased promptly through the receiving process and price ticketed in such a way as to meet the demands of the unit control system. To do this I will read an outline of what I consider to be an efficiently operated centralized receiving, marking and stock room and the way it functions:—

### Outline of Central Receiving, Marking, and Stock Room

The functions of the central receiving, marking and stock room may be briefly stated as follows:—

#### Receiving:

1. Receipt of merchandise will be acknowledged only when handled through the company's official receiving stations where all shipments are recorded and verified as to number of packages, weight and outward appearance.
2. Shipments received in this manner are immediately despatched to the receiving room.
3. The receiving room is under the direct supervision of the receiving and marking room supervisor and is divided into ten groups, each group comprising several departments closely related as to class of merchandise handled as per attached chart, and each department will be allocated a separate section for checking and marking of their merchandise.
4. A head checker in charge of each group will be held directly responsible to the receiving and marking room supervisor for the checking of all merchandise as to quantity, style and condition as well as for the proper marking of merchandise for his group of departments before being distributed to forward or reserve stock.
5. A crew of junior checkers as well as marking girls will be maintained to assist in the checking and marking of merchandise in any group as required at the discretion of the marking room supervisor.
6. The checking and marking of merchandise must be proceeded with immediately as soon as the merchandise is received and the corresponding invoice available on the invoice file.
7. Buyers of all departments will visit their receiving room section regularly each day and dispose promptly of the reviewing and retailing of all merchandise available.

It is imperative that the aforesaid receiving and marking schedule should be lived up to implicitly to prevent congestion of receiving room facilities and avoid retarding of the movement of merchandise and invoices through all the necessary stages of routine, so that the figures pertaining to merchandise in transit and in stock derived from the invoices for the construction of the merchandise report and forming an important basis for operations may exhibit a true picture of the actual conditions at all times.

For this reason should any department fail to deal with their merchandise and invoices within the stipulated time limits the traffic manager, after advising the department concerned, will have the prerogative to mark such merchandise and retail invoices according to



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selling prices derived from the orders on file and the responsibility for any errors occurring as a consequence will rest solely upon the department manager in default.

8. The receiving and marking room supervisor will prepare and submit to the traffic manager a daily report of goods remaining in the receiving room beyond the twenty-four (24) and forty-eight (48) hour schedule referred to under paragraph seven (7), stating reason for delay, whether because of no orders, no invoices, not retailed or for any other reason.

9. It is the joint duty of the buyers and head checker to see that claims are issued for all shortages, damages, goods not according to order or for any other reason before the merchandise is disposed of and the traffic department claims adjuster called in to verify claim and to take possession of any goods to be returned or held pending disposition of claim, as well as to make arrangements for all inspections by transportation claims agents and marine surveyors, etc.

### Marking:

1. Merchandise for all departments must be marked in accordance with approved price marking regulations and under marking room supervision, and under no consideration may merchandise of any description be despatched from the receiving room to forward or reserve stock before being properly marked. Goods, the nature of which will not permit of it being handled through the receiving room, will be checked and marked in the stock room or warehouse by the receiving and marking room staff.

2. When properly checked, reviewed and retailed as described in the preceding paragraphs, the invoice (signed by department manager) will be transferred onto the marking file and submitted to the marking office who will execute the ticket order with uniform, standardized printed price tickets corresponding to quantity and data on the invoice. The invoice apron in the space provided for this purpose will be stamped with the ticket order number, and the tickets when completed will be placed in a paper bag bearing the corresponding number; the bags of tickets will be deposited in bins designated for each department and head checkers for each group of departments will see that all price tickets ready for departments in their charge are promptly placed on the merchandise by the marking crew.

3. When the receiving, checking and marking procedure as above described has been completed, merchandise will be distributed to forward or reserve stock as directed by department manager.

4. Standard information to be printed on all price tickets as follows:—

(a) Small Tickets (Pin, String, Gum, Pin On, etc.).

First Line —Department and section.

Second Line—Invoice number, season and month.

Third Line —Size and/or color.

Fourth Line—Price.

(b) Large Tickets (Ready-to-Wear, Furniture, Carpets, etc.).

First Line —Department and section.

Second Line—Invoice number, season and month.

Third Line —Make.

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Fourth Line—Size, and/or color, or finish, or number of pieces.

Fifth Line —Price.

5. All re-marking of merchandise must be handled through the marking office and requisitions for reduced price tickets of any kind will be executed only when supported by "Markdown Report" properly approved by the merchandise manager. On no consideration may merchandise be re-marked in pencil or ink or other than under marking room supervision. "Markdown Reports" for merchandise requiring remarking should be submitted to the merchandise office for approval in sufficient time to allow twenty-four hours for the execution of the new tickets and the re-marking of the merchandise.

6. Re-marking of merchandise transferred from one department to another will be handled through the marking room and must be supported by properly approved merchandise transfer. The physical transfer of merchandise will be arranged by the marking room supervisor after the quantities have been verified and the merchandise marked. (See instructions on transfer sheet.)

7. The person in charge of each selling section should be held responsible to see that all merchandise within his charge is properly marked at all times, and to submit daily a signed request endorsed by the buyer or assistant for replacement of tickets lost or destroyed, or goods returned by customers without price tickets.

8. The manager of each department will arrange with the person responsible for recording of merchandise taken to and from window display to remove from such merchandise all price tickets before being surrendered to the window display department, and to replace the tickets on merchandise when returned to selling department.

### Stock Rooms:

1. The head checker of each group, with the assistance of the junior checkers when necessary, is responsible for the proper keeping and arranging of merchandise for the departments in his charge and to provide adequate protection to the stocks against deterioration from any cause while in his custody. Stocks should be kept in the best possible manner suitable for the particular type of merchandise handled, and in addition to providing a separate section for "old merchandise" to be concentrated on, the head checker should keep departments posted on any merchandise which from his observation is moving slowly.

2. Damaged or other unsaleable merchandise and merchandise rebated to "No Value" must not be retained in stock rooms, but should be disposed of in accordance with instructions governing "No Value" merchandise.

3. Delivery of merchandise from reserve to forward stock will be made by the receiving, marking and stock room staff between 8.00 and 9.30 a.m. as requisitioned by departments not later than 4.00 o'clock p.m. on the day previous. "Fill Ins" required during the day must be handled by departmental staff.

This, I think, will illustrate the importance of the receiving and marking function.

Now, as I said before, perhaps the most interesting phase of department store operation from the accountant's standpoint is the

## DEPARTMENT STORE MANAGEMENT AND ACCOUNTS

determination of profitable or unprofitable lines of merchandise as well as slow and fast selling merchandise. This is usually done by means of some form of piece records or unit control system, and to show just how thoroughly some stores have gone into this problem to enable their buyers to make their purchases intelligently, I will read through an outline of a system of unit control adapted to ready-to-wear departments, after which I will exhibit and explain specimens of the forms used:—

### Unit Control for Ready-to-Wear Departments—General

The following preliminary arrangements must be made before this system can be successfully installed:—

1. Each department must be divided into a few well chosen merchandise classifications.

2. A definite, full and complete standard price line must be established, and once established, *rigidly adhered to*.

3. Price tickets on stock on hand must be made to conform with the standard price line by making the proper retail adjustments.

4. Price tickets must show all information necessary to operate the system usually consisting of the following:—

1. Manufacturer's code number and style number.
2. Season, month, and invoice number.
3. Department number.
4. Classification.
5. Color and size.
6. Price.

A duplicate ticket with perforated stub must be used.

5. It is imperative that every transaction relating to stocks on hand or on order must be routed through the unit control office and must be so stamped.

6. Unit control offices may, because of convenience or necessity, be located in or adjacent to selling departments, but the staff shall be directly responsible only to the accountant or controller.

7. The following equipment consisting of binders and indices will be required:—

1. Automatic shifting visible index binders.
2. Alphabetical indexed dividers.
3. Plain dividers.

### Routine—Individual Item Control

This form will be filed by manufacturers in a special automatical shifting visible index binder. Its use will be indicated by a study of the descriptive text under *Routine*, and an illustrated specimen follows:—

#### A—Purchase Orders:

Immediately after placing an order for merchandise, the buyer, whether in the market or at home, shall see that the yellow copy of the order is forwarded immediately to the unit control office for entry on this form, on which shall be posted the following details:—

1. Date and quantity ordered, the latter in red ink.
2. Description of merchandise, classification letters, etc.
3. Manufacturer's name and number.
4. Purchase order number.
5. Colors and sizes, quantities posted by tally in red ink.
6. Selling price.

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### **B—Cancellations:**

In the event of any order being cancelled, either in full or in part, a copy of cancellation notice shall be forwarded to the unit control office for entry on this form. The record should not, however, be actually cancelled until sufficient time has elapsed to ensure the fact that shipment has actually been cancelled by the manufacturer.

### **C—Deliveries:**

Upon delivery of merchandise, the receiver shall make out a special form in duplicate showing:—

1. Date received and quantity.
2. Order and invoice number.
3. Manufacturer's number and style number.
4. Landed cost and retail price.
5. Classification, colors and sizes.

The original of this form shall immediately be sent to the unit control office for record, and the duplicate shall constitute the requisition for price tickets. A specimen form satisfactory for this purpose follows this "routine" outline.

Comparing this information with the record already compiled from the buyer's purchase order, the unit control clerk may readily see whether or not the information is correct. If correct, those quantities previously entered in red ink shall now be gone over with black ink. Date received, landed costs, and any other information not available from original order may also be filled in.

If the information does not tally the unit control clerk shall ascertain that no mistake has been made by reference to the buyer and shall then enter the merchandise, flagging those numbers which were not as specified. All cases of this nature must be reported to the buyer daily in order that all warranted claims against the supplier may be made.

### **D—Returns to Supplier:**

When merchandise is returned to the supplier, a list of such returns shall be sent to the unit control office, and once each week this office should review the claims book to see that all claims have been properly recorded on this form.

### **E—Sales:**

Whenever merchandise is sold the sales clerk shall detach the lower portion of the price ticket and after writing his or her number on the detached portion shall deposit it in a box placed at the cashier's desk for that purpose. The manufacturer's code number, style number, classification, color, size, and price must all appear on the sales check.

The following morning the stubs shall be collected by a member of the unit control office and sorted according to clerk numbers which appear on the reverse side. A comparison shall then be made with sales check tissues or tallies to see that all sales have been accounted for. Stubs should be retained in the unit control office for at least a month in order to facilitate the preparation of reports hereinafter described.

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### F—Customers' Returns:

All merchandise returned by customers must pass through a special stock room on the selling floor, and must remain there until new price tickets have been supplied. If a stub ticket is still attached the reverse side should be marked "R.T.S." (returned to stock). Each day the department stock clerk shall order new tickets for this merchandise and send a list with full particulars to the unit control office for record. The unit control clerk shall review all cash refunds, charge credit books, and exchange transactions, to see that all customers' returns are accounted for and posted on the individual item control form. A running analysis of returned sales shall be maintained by prices and merchandise classifications in order that the proper deduction may be made when preparing the weekly summary of stock and sales form.

### G—Changes in Retail Prices:

When markdowns or advances are taken the markdown books must be sent to the unit control office, and all changes on retail prices shall then be entered in pencil in the extreme upper right-hand corner of this form, pencil being used to permit further changes to be recorded.

### H—Physical Inventories:

Physical Inventories shall be taken frequently, every other Monday morning being suggested for coats, dresses and millinery, and the unit control office should maintain a constant test check of its figures, to see that the system is functioning accurately. Apparent shortages should be investigated immediately.

By checking with inventories the number of months in stock may be indicated on the visible margin of this form and slow selling numbers may be easily detected.

### I—Reports:

The following reports will be prepared periodically for the buyers and merchandise managers:

1. Stock and sales report—once each week showing stocks on hand on order, and sales in units by price lines for each classification of stock.
2. Stock and sales report—once each week showing accumulative sales by colors and sizes.
3. Stock and sales report—by manufacturers—showing once each month the movement of merchandise by manufacturers as well as gross profit on merchandise sold.

In addition to unit control systems, such as I have described other methods are employed to help the buyer determine what and when to buy. These depend on the type of department concerned. The hosiery department might install a reserve stock control only, and many of these are successfully operated. The toilet goods and drugs section might employ a slightly different reserve stock control with an automatic buying feature, which would take a great amount of detail from the buyers' shoulders. Other departments, like piece goods, notions, and draperies might merely be broken down into a number of subsections, for which complete records as to stocks, sales, markup, markdowns, and gross profit would be maintained. All of this is done for the purpose of locating and determining the true movement of merchandise, the sources of profitable operation, and the sources of losses, and I wonder if I am not right in thinking this may be a good field for the cost accountant?

## The Uncommercial Engineer

By PROF. E. A. ALLCUT,

*Department of Mechanical Engineering, University of Toronto*

(Before Toronto Chapter, March 27, 1930. An exact copy of Prof. Allcut's address is not available, so the principal points are summarized below.)

**T**HE engineer may be defined as "a fellow who can do for one dollar what any fool can do for two"; or, as an alternative, as "one who harnesses or directs the forces of nature for the use, comfort or convenience of man."

Forces of nature are discovered by philosophers and physicists. It is the job of the engineer to apply these forces.

Four steps in this application are:

1. Invention.
2. Adaption to practical form.
3. Development on commercial scale.
4. Analysis into elements for production purposes.

The process of invention is not an intermittent manifestation of mysterious power exhibited rarely and somewhat capriciously in men of genius. It is a cumulative accomplishment due to many obscure and unrecognized innovators whose efforts were essential but not immediately conspicuous,—the continuous activity of common mental processes.

The process of technical development is the very essence of history—the heroes are not statesmen, warriors and political leaders, but scientists and explorers. The statesman is dominated by an external condition or necessity, the inventor by an inward urge or unfulfilled wish.

Discovery is the perception and appreciation of relations existing in nature not previously recognized. Nothing new under the sun, e.g., radium and other chemical elements.

Early science was merely a commentary on existing practice of arts or crafts—experimentation became progressive and systematic only towards close of Middle Ages.

War brought new problems and solutions, e.g., Archimedes and Leonardo da Vinci.

Slave labour existed in Mediterranean, which was densely populated, and where labour saving devices were not necessary. North-west Europe was sparsely populated, there was more interest in invention and greater use of animal power.

Greeks supposed that all substances were composed of Fire, Air, Water and Earth. "Mechanics" in Hero's time meant "lifting heavy weights."

Thus transmission of forces became established through five machines: Lever, Wheel and Axle, Pulley, Wedge, Screw. The lever was known as early as 1550 B.C.; pulleys and wedges were in use B.C.

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Applications.—Food, as in grinding corn and pressing olives; Drink, water from wells; Weapons, catapults, crossbows, etc.; Clothing, textile machines and apparatus—loom early in Christian era; Shelter—raising stones for buildings and ships' gear.

Book of Aicill—3rd century A.D.—fixing responsibility and liability for accidents in mill—people did their own grinding.

Society more complex—greater concentration of population—larger and more complicated machines.

Clocks were known to ancient Egyptians—geared clocks possibly as old as 9th or 10th century—liturgical requirements of monastic houses.

Art of Printing enabled discoveries to be perpetuated and circulated. Many inventions to produce one result: (1) Paper; (2) Inks with oil base; (3) Engraving on wood or metal; (4) Development of type founding and metal reproductions; (5) Presses and press work.

Before Leonardo.—Mechanical engineering was merely an incidental feature in building trades, heavy metal trades and military work, i.e., architecture and soldiering, civil and military engineering.

After Leonardo growth of large communities—specialized labour—larger machines and more elaborate tools culminating in industrial revolution: (1) Transfer of skill from man to machine; (2) Transfer of ownership and advent of capitalist.

Two Great Innovations.—(a) Generation and Transmission of Power in Large Quantities.—Watt, 1765, followed Worcester, Savery, Papin and Newcomen. Analysis and revision made large scale industries possible. Water Power—Furneyron—1832—50 H.P. wheel important influence on regional distribution of industries, large power consumers where no fuel. Influence on electrical distribution in coal areas—e.g., England.

(b) Transportation—Trevithick, Evans and Stephenson, derived from work of Watt, probably the greatest contribution of engineering to human welfare—makes nation interdependent—facilitates interchange of ideas and experience, tends to promote mutual tolerance and understandings, so to prevent war. No time to speak of new and improved materials and processes all of which benefit mankind.

Process.—(1) Technological change; (2) Development of consequences; (3) Revision of law and custom.

Technological Change frequently only reduces costs or increases production: Different furniture, but no better than Egypt; different porcelain, but no better than China; different buildings, but no better than Greece or Rome.

After allowing for all of these factors there is a very considerable remainder in which engineering has contributed to the sum total of human happiness and comfort by distributing such luxuries more uniformly among the people. It is not too much to say that modern civilization and all that it represents is based upon engineering, and with the increasing organization of invention and greater facilities for research now being provided it is reasonable to expect that this process will be cumulative—whether this in turn will give corresponding benefits to the human race, time will show.



## Control of Labour and Material in Process

By W. M. LANE,  
*Lever Bros., Ltd., Toronto.*

(Before Toronto Chapter, February 12, 1930)

IN attempting to discuss this subject of "Labour and Material Control" before you to-night, I feel about on a par with a certain old negro gentleman as regards speech-making, ability and experience. A friend once asked this old coloured gentleman whether he had ever addressed a large audience. The old man replied: "Ah did, once." "What did you all tell them?" his friend asked. "Ah said, not guilty, Your Honour." So, Mr. Chairman, "Your Honour," I must plead "not guilty" to any charge laid against me of being a cost accountant. I make this confession now because I realize that you will quickly find me out anyway.

It is difficult indeed with such a subject as that assigned to me to-night to present any phases of it which may be new or interesting to you, who come in contact with it daily in your capacities as cost accountants, general accountants or professional auditors. My difficulty reminds me of the man who operated a bird store. This merchant had one parrot which was particularly talented and of which he was very proud. He hung this bird near the door of his shop, where it was in the habit of greeting each customer who entered the store with the cry "I know something about you." Naturally this embarrassed some and amused others. An Irishman came into the place one day and was greeted by the same cry. Pat wanted to buy the bird at once, but couldn't persuade the owner to part with it at any price. Finally Pat agreed to be satisfied with three eggs of the parrot, and he set these under a hen until in due time they hatched out. From one of the eggs came a crow, an owl came from the second and a sparrow from the third. Pat hurried back to the store to lodge a complaint. As he entered the door the old parrot squawked out at him again, "I know something about you." "You do, do you?" said Pat, "Well bedad it isn't a circumstance to what I know about you." So, gentlemen, I may know something about this subject, but I'm afraid it isn't a circumstance to what you already know. However, I'm going to try to point out some of the good things and some of the bad about cost accountants and some of the virtues and faults of cost systems.

It is practically impossible to consider the "Control of Material" without at the same time giving some thought to the problem of "Labour Control" as well, and it seems a very ambitious programme indeed to undertake any comprehensive discussion in one evening of these two important factors of cost.

### Human Element in Industry

Practically the whole field of cost accounting is embraced in a consideration of the control of labour and material for a considerable part of that third factor—Overhead—in any plant consists of labour, material, or both in some form or another. But there is another factor in any satisfactory cost system which I think should rank



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equally with the three commonly accepted elements of cost—labour, material, overhead. In fact I would rank this additional element first. I refer now to the human element in any industry. The work of a cost department in controlling labour, material or overhead comes up against the human element at practically all points and any reference to-night to labour control will be with regard to this human element.

I am sure I need offer no argument to convince you of the importance of maintaining a rigid control over the cost elements which enter into the products of our industries. When we consider that the value of manufactured products in Canada in 1870 amounted to \$221,000,000, and that in the fifty years to 1920 this increased to a total of \$3,772,000,000, you will see how great a drain on our national wealth may result if only a small percentage of the total is lost through faulty control.

Undoubtedly in many instances you have seen inventory adjustments made after little or no investigation as to the cause of the shortages. Thousands of dollars of material values are written off annually in many industries after only a casual investigation. Your cashier will spend hours, if necessary, to locate a difference of a few cents in his petty cash fund, or your credit department will go after a customer almost with a gun to collect a small disputed balance, yet in cost accounts when we deal with valuable materials we are content in many instances with a control system which is no better than approximately complete and we accept as necessary evils the inventory shortages, production wastages and deviations from standard which are experienced in most cost systems. Leakages of material represent lost dollars just as surely as stolen cash or uncollectible accounts receivable, and due to the greater volume of materials involved in our industrial activities there can be no doubt that an adequate control is advisable—yes, vital.

### Scope and Purpose of Cost Work

It might be well first to consider briefly the scope and purposes of a system of control or, as it is commonly called, a cost system. In many instances it seems that the cost accountant's idea of the ideal cost system is far from the idea of the general manager. Naturally any system requires certain types of forms and records, varying only in detail according to the needs of the particular business in which they are used. These are the elementary tools of cost accounting, and I do not intend to spend any time in describing them or discussing their form or use. These records and forms, necessary as they are, should not be elevated to a position of first importance. The routine operation of the system must not obscure the benefits to be obtained from it. Too many cost systems become chiefly a matter of figures, problems in mathematics, the accuracy of which must be checked and proven. The actual use to be made of the information supplied by the system is lost sight of, and the cost department feels that its work has been well done when elaborate forms have been completed and the correct answer has been obtained.

There is great danger of the control system becoming too complicated, too elaborate and too expensive. At first the system may start out containing nothing but essentials, but unless it is watched carefully pet ideas and schemes of various people become attached to it; frills and non-essentials are tacked on which do not contribute

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directly and indispensably to the main purpose for which the system was designed. Results and information are delayed by these excrescences so that facts which might otherwise be of use to the management become available only after their value has disappeared.

I have no wish to criticize cost systems or cost accountants, but merely suggest a few points which may endanger the value and usefulness of your system. Granting that proper forms and records must be in use and that these will produce an accurate cost figure, let us consider what more the general manager may require from the system.

### Goes Beyond Mere Cost Finding

I think you will agree that a detailed system to control materials through the plant is not required for the regular financial accounts of a company. The cost of goods consumed in manufacturing during any period can be obtained satisfactorily by taking inventories at the beginning and end and by keeping accurate records of purchases. This is practically all the material control system that is necessary to determine the profit or loss for the period. Why then should we arrange elaborate systems and what results may the manager fairly expect from them? He has very little interest in the *routine operation* of the system other than to note that it is being carried on as economically and efficiently as possible. What then does he expect?

First—The most important requirement of any cost system is that it shall pay dividends; that is, it must increase the profits of the business. The main object of any business is the earning of profits, and a cost system is judged by the extent to which it contributes to these profits.

Second—The system must provide standards for measuring the efficiency of various manufacturing divisions. It is a delicate problem when you start to measure the work of another, and this brings you at once against the human element. No other phase of cost work requires so much tact in its handling. More will be said about it later.

Third—The system must establish correct costs and thus determine whether the product is being sold at a profit or loss. Most cost accountants consider this the *chief* purpose, if not the *only* purpose, of their cost systems. I agree that this information is of prime importance but it is only the starting point of the usefulness of your system. When this information is given to the Manager his work begins.

Let us suppose that the established cost shows that at the existing selling price a loss will result. What then? Any of you who have had experience with sales managers will appreciate the situation that follows. Your sales manager needs very little encouragement to reduce a selling price, but it takes a lot of convincing to get his selling prices increased, particularly on a standardized product. Actually, the sales manager will contend that your costs are wrong; perhaps they are, certainly something is wrong and the value and usefulness of the cost system can be demonstrated more quickly by the ease with which it points out the cause of the condition and suggests a remedy for it.

Fourth—The cost system must show how profits may be increased or losses overcome, in other words explain the results of the selling of the product. It may be that certain lines are unprofitable even

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when the selling and manufacturing methods are efficient. Your cost system may show that such lines should be retained for the share of overhead expense which they take from the more profitable lines or the system may show that certain lines should be dropped for the good of the business. The manager must be able to base much of the marketing policy of the company on your costs, and I think it is quite within your responsibility to submit your recommendations to him.

Fifth—By comparison of actual costs to standard costs you can show where profits are going that should have been earned, in other words you will plug up holes in the profits. You will show up inefficiencies in manufacturing and make your system a good investment for the business.

### Cost Accountant's Viewpoint

These are some of the things the manager expects from an adequate control of cost factors, and no cost accountant can successfully approach the problems of his position unless he has these important requirements constantly in mind.

May I repeat that control of material and labour through your cost system, no matter what industry you are engaged in, is more than a problem in record keeping. Your system must be a good investment and justify its existence by the profits it yields or the manager will eliminate the system.

Thus far I have dealt with certain general phases of cost control. I think it was advisable to do so because when one has the proper vision of the benefits to be obtained through control of labour and materials one is no longer a "cost clerk" but becomes a true "cost executive."

There are undoubtedly many other benefits to be derived from cost control, but let us consider briefly some of its specific problems.

I have little to say regarding labour control, as I understand that this subject is to be dealt with at succeeding meetings of our association. The cost of labour can be measured with exactness and controlled to a degree that practically eliminates losses. There is the one phase, however, of labour control which is of interest to us because it is also such a large factor in the control of material. I refer again to the human element, and we shall discuss some of its problems shortly.

### Control of Material

The control of material presents two main problems: First, that of value; second, that of quantity. The problem of controlling values is of sufficient importance to require separate consideration. It brings up problems of budgeting, planning, purchasing, pricing of inventories and of the recording of values through the process accounts in the cost system. Some of these points have been dealt with by the speakers who have preceded me, and I do not intend to devote further time to the control of material values.

Quantity control is the problem to be considered now. Undoubtedly any good cost accountant can plan a satisfactory system for quantity control of material. The cost system may be planned most thoroughly and most carefully installed by an expert, and nothing overlooked in the matter of records and equipment to make it perfect, but when theory ends and practice begins the system falls far short of the

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success which is expected of it. The resulting lack of control arises from that most variable of factors—the human element. If we are to have any success in controlling materials or labour we must succeed in controlling this human element. Probably we should start to set our house to order first in the cost department itself by considering some of the problems which the human element presents there.

(1). Are your cost accountants factory trained men? Do they have the factory viewpoint? Quite often the members of the cost department are men of a strictly clerical type and have very little training in an understanding of the operations of manufacture. We need more factory trained men in our cost departments.

(2). Does the cost system follow closely the actual operations in the factory, or is it designed to fit into a general accounting system?

The handling of materials in your stock room, the fabricating of these materials in your shops and the assembling of the product all follow careful plans based on efficient manufacturing practices. Your cost system should fit the factory rather than the factory fit the system.

(3). Are your cost men familiar with the various raw materials that enter into the products of your plant? Do they know what these look like? Where they are purchased? What grades are required for your product? What substitutes, if any, can be used when prices make it advisable to substitute? Are they familiar with the receiving room routine and where the goods are stored and why certain systems of handling are followed in the receiving department? In short, can they sit at their desk and visualize every operation throughout your plant?

(4). Do your cost clerks *understand* the cost system step by step? Can they interchange work? Do you have a manual of instructions explaining clearly every step in your cost activities so that the ambitious employee can learn all about the work of his department? Do you have a definite plan for training new employees who come into your cost department?

(5). Do your cost accountants co-operate with the factory management by furnishing reports and information that will help solve the numerous problems of factory control? The fostering of this co-operative spirit between cost department and works is the most important of all the human element problems. There is no place for jealousy, obstructive tactics or the withholding of vital information which will further the progress of the business and contribute to its profits. The cost department helps itself most when it is helping other departments most. The human element in the cost department is indeed a problem which must never be overlooked. Careful selecting and training of cost men is of great importance because the success of any system of cost control you may be following depends entirely on their efforts.

### Problems in the Factory

Now what are some of the problems with the human element in the factory?

First, the factory man whether he be workman, foreman or even works manager does not have the cost accountant's viewpoint. He looks on a cost system usually as something put into the factory to

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annoy him or in many instances does his best to prove that the system will not work. This is because the factory man feels that all the record-keeping and preparing of reports which he comes in contact with is unnecessary and foolish. He hasn't been properly sold—he does not have your broader vision of the cost system. Perhaps the greatest resistance comes from the foreman. This resistance may be passive, but it is nevertheless real and can surely wreck a system. These men are just as anxious to see the company yield a real profit as you are, and they will co-operate splendidly with you when they once understand what you are trying to achieve. How can we break down this misunderstanding between office and factory? It is a problem in education which must be solved in the best way possible in your plant. It is a problem of real importance too, and worthy of your most careful thought. It can be approached from several angles, first, of course, the factory manager must be thoroughly convinced of the value and importance of your cost control work. Much can be done then through little informal conversations with individual foremen, being careful at all times not to give them an impression that you are condescending in thus acquainting him with the mysteries of cost accounting. These men in the works must be met and treated as fellow employees and equals in service no matter what your relative social positions may be. Any suggestions of "High Hat" on the part of the office man is fatal to the establishment of true co-operation.

In some plants there may be employees' clubs or some such organizations in which these problems can be described and discussed. Much may be done through a "house organ" if one exists in your organization. The co-operation of the departmental foreman may be gained by showing him comparative statements of operating cost in his department, or by pointing out to him how this information can aid him in producing better results, which in turn will enhance his value in the estimation of the management. There is no surer way of gaining the confidence of these men and thus their enthusiastic assistance, than by helping them to progress.

### Need for Education

In addition to this problem of the lack of co-operation there are two other very common weaknesses in the human element which you cannot escape—ignorance and carelessness—the remedy of course lies in education. Careful instructions must be issued covering the entire routine handling of materials from the time they come through the receiving room door as raw materials until they leave the shipping room as finished products on their way to the customer. Carefully prepared instructions are not sufficient though; there must be a constant check-up to see that these instructions are understood and are obeyed to the letter, as any letting-down of the control opens the way for error. Ignorance of the details of one's duties can be overcome and, of course, must be dealt with in all new employees. There are other forms of ignorance, however—lack of fundamental general education is outside our control. This is a matter for the individual to deal with and correct through the various agencies available to the ambitious who wish to increase their education along various lines.

There is also lack of tact, lack of the idea of team work and lack of foresight, etc., to contend with. How often do we hear the excuse from a blundering employee, "I didn't think of that?" Too much of

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our cost work is done as mechanical routine. We must stir up the employee to really think. Those in charge of the work of others can meet these faults only with patient instructions and suggestions. If the individual does not respond promptly to these efforts it probably is necessary to replace him with another offering greater promise.

Carelessness, however, can be dealt with only by stern discipline. In an organization where large losses of value or even of life itself may result there is no room for the careless employee. This fault is inexcusable. If the fault is not firmly rooted in the individual it may be overcome by sincere advice promptly given. For the habitually careless employee I can suggest no treatment other than removal from the payroll.

So I think the control of material or any other factor in costs depends largely on the control of the human element in our cost departments and in our plants. If your systems have been carefully planned and properly installed their successful operation will depend on the *people* who operate them. Educate your employees first for their own particular duties, but give them also a comprehensive understanding of the whole scheme. Strive for co-operation and eliminate friction. Encourage initiative and welcome any constructive suggestions whether from the factory or your own cost ranks.

There is a great deal more that can be said about controlling material and labour in our plants. I have purposely avoided comment on specific systems or routines. These are common knowledge to qualified cost accountants. I have tried rather to submit for your consideration some of the broader problems the cost accountant must be prepared to face if he is to exercise proper control over the cost elements in his organization. From all sides we are hearing warnings that the fat years of easy prosperity are over and that industry must put its house in order. To insure the continued growth of our country we must look more and more to the cost accountant for constructive guidance.

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## NEW BOOKS

**M**ANUFACTURING Costs and Accounts. By A. Hamilton Church. McGraw-Hill Book Co. Inc., 370 7th Avenue, New York. \$6.00.

This book of 516 pages is a second edition of a work, the original edition of which was reprinted seven times since its appearance in 1917. That of course was an excellent tribute to the quality of the work. In the new edition it is thoroughly revised and brought up to date, and new chapters have been added on departmentalization, on recent modifications of costing methods, and on the use of diagrams and charts.

The book gives a general description of manufacturing accounts, a thorough treatise on cost accounting, and a discussion of the nature of reports and returns and their relation to the general accounting system. It is liberally illustrated with diagrams.

Other books by the same author are: *The Proper Distribution of Expense Burden*; *The Science and Practice of Management*; and *Production Factors in Cost Accounting and Works Management*.

## COST LITERATURE

# COST LITERATURE

RECEIVED IN AUGUST

**T**RUCK Costs and Analysis. Myron Bohn. National Association of Cost Accountants, July 15, 1930.

Weaknesses in Standard Costs. W. B. Lawrence. National Association of Cost Accountants, July 15, 1930.

A Group Bonus Plan for Supervisory Forces. M. R. Lott. National Association of Cost Accountants, August 1, 1930.

Standard System of Accounting for Retail Grocers Designed. National Association of Cost Accountants, August 1, 1930. Reprint from Domestic Commerce.

Co-ordination of Cost Records with the General Accounts. T. L. Evans. National Association of Cost Accountants, August 1, 1930.

Industrial Plans for Supervisory Employees. P. W. Burns. Society of Industrial Engineers, July-August, 1930.

Design and Control of Office Forms. R. C. Slaypoole. Society of Industrial Engineers, July-August, 1930.

Costing as Applied to the Cutlery Trade. H. Wild, F.C.W.A. Cost Accounting, July, 1930.

Some Practical Problems in Works Accounting and Their Solution. G. H. Clamp, F.C.W.A. Cost Accounting, July, 1930.

The Use and Misuse of Charts. Cost Accountant, July, 1930. Reprint from Industrial Welfare and Personal Management.

General Motors Has New Accounting Tool for Controlling Production. D. Brown. American Accountant, August, 1930.

Production and Cost Form for Use in Foundries. American Accountant, August, 1930.

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## OUR SOCIETY PREPARES FOR GOOD SEASON

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**T**HE arrival of September brings our thoughts back again to the fall and winter routine, and to our Society's meetings, which are near enough to our work to be valuable, yet far enough away to be a distinct change from the routine. It is always interesting to hear how the other fellow does his job, and how he might do ours.

Our members will no doubt be glad to hear that the six months just ended have been the best in the history of this Society, in respect of membership, revenue, etc. Consequently we open this new season with a larger membership than in any previous year. In view of business conditions, this is good evidence of the stability of our membership. Indeed many concerns have taken advantage of a low business volume to check up on their office and plant methods. In busy times the handling of work absorbs all attention, and we do not make



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changes except when they are forced upon us by circumstances. A year such as the present means a good chance for thorough overhauling of equipment and methods. If we cannot make money now we should at least get ready to make the most of opportunities when they do arrive.

Montreal Chapter got an early start on its programme plans, and its arrangements are nearly complete. Toronto Chapter, mindful of the fact that it is largely responsible for the "I. E." now added to our name and scope, is figuring on fifteen meetings, some of which have already been arranged. Hamilton, Winnipeg and Central Ontario directors are also working on programmes for the season.

The first joint meeting of Toronto, Hamilton and Central Ontario Chapters will be held in Toronto on October 1, at 6.30 p.m.

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## TREND OF PRODUCTION COSTS

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**F**URTHER declines in many commodities in July brought the Dominion Bureau of Statistics index number of commodity prices down to the lowest figure for some time. The following is a comparison of the figures:

	July 1929	June 1930	July 1930
Food, beverages and tobacco .....	99.7	95.0	93.0
Other consumers' goods .....	91.3	86.4	85.9
All consumers' goods .....	94.7	89.8	88.7
Producers' equipment .....	94.9	91.5	91.3
Building and construction materials .....	98.9	92.2	90.1
Manufacturers' materials .....	101.8	82.5	78.5
All producers' materials .....	101.3	84.3	80.6
All producers' goods .....	100.6	85.0	81.7
All commodities .....	97.2	88.0	85.8

A total of 502 commodities are used for these indexes, and 1926 is the base period. There was little net change in the above groups up to the past year, but manufacturers' materials are now down to 78.5 per cent of the 1926 level, and building supplies down to 90.1 per cent. The result is a large saving in cost of materials going into production. Prices of consumers' goods, which are mostly manufactured goods, have decreased less sharply.

The greatest decreases in July were in the following: Grains, flour and milled products, vegetables, live stock, meats and poultry, raw cotton, raw silk, silk fabrics, wool yarns, lumber and timber, aluminum, and copper. Advances were few in number and unimportant.

The labor supply is plentiful in relation to requirements, and some reductions in wage rates have occurred.



